# Effect of Background Alfa Brain Music Waves on Nursing Students' brain functions' and Learning Style

**Asmaa Ahmed Ibrahim Morsy** [1]**, Yasmeen Mohamed Mohamed Shehata** [2]

[1,2] *Lecturer of Nursing Education, Faculty of Nursing, Alexandria University*

## Abstract

**Background**: Music is known to have positive effects on humans, enhances learning and aids the healing process. **Aim:** determine the effects of background Alfa brain music on students' cognition and learning style. **Design:** A quasi experimental research design was used to conduct this study. **Setting**; this study was carried out at Nursing Education Department, Faculty of Nursing-Alexandria University. **Subject**: The subject of this study comprised of 160 nursing students who were registered in "Scientific Thinking course" during the first semester of the academic year (2021-2022). The subjects were assigned randomly into two equal groups; study and control, 80 students for each. **Tools:** two tools were used for data collection; Tool I: Visual, Aural, Reading/Writing and Kinesthetic (VARK) inventory, Tool II: Alert Scale of Cognitive Style. **Results**: It was observed that there were statistically significant differences between study and control groups and within the study group in the favor of study group after the application regarding VARK and brain hemispheres as p=0.001. **Conclusion:** Alfa brain music had positive impact on students' learning as it improves the usage of both brain hemisphere and engaging students with different learning styles. **Recommendation**: it can be recommended that teacher should use Alfa music during lectures and sections with different specialties and try to use other types of music with its specified purpose.

**Keywords:** Alfa Brain Music Waves, brain hemispheres, Learning Style

## Introduction

Internal learning is a complicated and deliberate process. It refers to the relationship between the brain, nervous system, and environment, as well as the process through which knowledge and abilities are acquired because of this interaction. The impact of one neuron on another alters when synapses experience physical and chemical alterations. Brain music waves, for example, can boost physical and physiological changes in the brain in a variety of ways. Music is a complex and evocative medium. It helps us to communicate our feelings and cultural ideas while also boosting physical exercise and improving our attention and creativity. Because of its ability to alter human mood and physiology, music is a popular stimulus for researchers in the disciplines of affective computing and affective neuroscience **(Byrne 2014, Levitin 2015).**

Music can operate as a nonverbal channel that travels straight from the auditory cortex to the limbic system, according to brain anatomy specialists. Furthermore, numerous studies have shown that music, particularly educational Alfa music, can alter one's state of consciousness and stimulate various parts of the brain, including the left inferior frontal gyrus, left and right superior temporal gyrus, left middle occipital gyrus, left anterior cingulate gyrus, right internal palladium, right and left superior frontal gyrus, left cingulate cortex, left anterior cingulate cortex, right hippocampus, thalamus , supplementary motor areas and bilateral cerebellum **(Frank 2015, Standring 2020,)**

There are different categories of brain waves according to the frequency, pitch and tone as brain music waves determined by Hans Beck 1925 as he classified it into four major

types of brain waves beta (β) , alpha (α) , theta (θ) , and delta (δ) waves. Beta music wave is the fastest waves with the shortest wavelengths appear when the person is awake in concentration, thinking, and stress. It is associated with short-term memory activation and is correlated with beta brain wave when the person is awake in concentration, thinking, and stress. While Alpha music wave appears when people first wake up in the morning, your brain is producing alpha waves which simply indicate that you are in a state of wakeful rest with closed eyes. It is the most receptive waves to new information and long-term memory and has a positive impact on creativity, problem solving, and intellectual achievement. It stimulates learning, increases the intelligence level and physical well-being, prepares the brain for receiving information, increases productivity and attention span time and decreases stress and tension. It is identical to the resonance wave of the earth which makes harmony fluency in information receiving **(Jensen 2016,** Kučikienė, Praninskienė 2018, **Lo, Deng 2020).**

Theta music waves are the brain states of rapid eye movement sleep, hypnosis, lucid dreaming, and the barely conscious state just before sleeping or just after waking. Theta waves are commonly associated with deep relaxation, meditation; intuition and higher consciousness promote meditation, deep relaxation, creativity, insight and problem-solving. It is associated with short-term memory activation. Delta music waves are the slowest waves and one of sleep characteristics'. It is used only when the automatic functions of the brain are required **(Rahman , Geadeon , et al 2020)**.

All the four types of brain music waves have direct effect on the brain function with its both hemispheres which function in a different way from each other as determined by *Hemispherity /Right Brain vs. Left Brain theory* which suggests that; the two different sides of the brain control two different modes of thinking as each one prefers one mode over the other. The left side brain is rational, responds to verbal instructions, solves problem by logic, sequentially looks at the parts of things, looks at differences, is planned and structured, prefers established information, talking, writing, multiple choice tests, ranked authority structures and sees cause and effect. On the other hand, the right side brain is intuitive, responds to demonstrated instructions, solves problem by hunches, looks for patterns, configurations and similarities, is spontaneous, prefers elusive uncertain information, drawing, manipulating objects, open ended questions, free with feelings, collegial authority structures, simultaneous, analogic and sees correspondences **(Bradley 2014,John 2015, Cain 2018).**

As brain hemispheres contain different learning centers which stimulated by the brain music, learning style can be changed, stimulated by the brain music. There are different type of learning styles as Fleming's VAK/VARK style which is composed of four sensory modalities. Visual style, where learners learn best by seeing and graphic displays such as charts, diagrams, illustrations, handouts and videos. Auditory style (Aural), where they learn best by hearing information, getting lectures and are good at remembering things they are told. Read/write style, where they learn best by taking in information displayed as words and using learning materials that are primarily text-based. Kinesthetic learning , where they learn best by touching, doing and hands on experience. **(Hussain 2017, Lorimer 2020)**

**Significance of the study:**

The researchers observed during their work that the majority of students in the scientific thinking course were either visual learner depending on the book and power point or auditory who ask for lecture recording which give indication that those students were unimodal or bimodal and their brain was unilateral so they conduct this study to assess their VARK style and brain hemispheres and help students to use both brain hemispheres and improve their learning styles by using Alfa music.

**The aim of the study**

Determine the effect of Alfa brain music waves on nursing students' cognition and learning style

### Research hypothesis

Students who were subjected to Alfa brain music exhibit higher score in brain cognition test than those who do not.

Students who were subjected to Alfa brain music exhibit higher score in VARK learning styles test than those who do not.

### Materials and method
### Materials

**Research design;** A quasi experimental research design was used to conduct this study.

**Settings**; this study was carried out at Nursing Education Department, Faculty of Nursing- Alexandria University (the researchers' specialty).

**Subjects**; The subject of this study comprised of 160 nursing students who were registered in " Scientific Thinking course" during the first semester of the academic year (2021-2022). The subjects were assigned randomly into two equal groups; study and control, 80 students for each.

**Tools;** two tools were used for data collection

### Tool I: Visual, Aural, Reading/Writing and Kinesthetic (VARK) inventory.

The first version of this tool was developed by Fleming in 1987 and the last version 7.8 was developed in 2010 which was used in this study. This tool was adopted by the researchers to assess the learning preferences or styles of nursing students. It consisted of 16 questions with 4 multiple choice items, categorized as (a) kinesthetic, (b) visual, (c) reading /writing and (d) aural. The student can select more than one answer. The total score ranged from 16 to 64, the student whose score was 16 had one modal, from 17 to 32 had bimodal, from 33 to 48 had trimodal and from 49 to 64 has multimodal learning styles. The tool's reliability was calculated using Cronbach's Alpha test, it was reliable and the test coefficient value was 0.934. Attached to it

socio demographic data sheet that include; age ,sex, semester ,last GPA, computer level and English level

### Tool II: Alert Scale of Cognitive Style.

This tool was developed by Crane in 1989 at the Western Michigan University. It was adopted by the researchers to assess students' brain dominance either right, left or doubled with various degrees. It consisted of 20 questions with doubled choice, no choice is right or wrong but the selection is according to student's brain dominance. Only one choice was allowed. The total score of this tool was 20 which, calculated as follows; underlined questions number 4, 5, 6, 10, 11, 12, 16, 17, 18 then counted the number of "A" responses for the underlined questions and the number of "B" responses for the questions number (1 ,2,3,7,8,9,13,14,15,19,20) which not underlined . Calculate the total of "A" and "B" responses. The score was interpreted as from: 0 - 8 left hemisphere orientation, 9 - 11 bilateral hemisphere orientation , 12 - 20 right hemisphere orientation. The tool's reliability was calculated using Cronbach's Alpha test, it was reliable and the test coefficient value was 0.847

### Method
### The study was performed according to the following steps:

1.Formal consent from The Research Ethics' Committee of Alexandria Faculty of Nursing was obtained before conducting the research.

2.Written permissions to conduct the study were obtained from the head of the Nursing Education Department after explaining the purpose of the study.

3.Tool I & II was adopted.

4.All tools were submitted to five experts in the related field to assess its content validity then the necessary modifications were done.

5.The reliability of tools was accomplished to measure the internal consistency of their items by using test & retest technique. The internal consistency was acceptable (Cronbach's alpha= 0.934 for Tool one and 0.847 for Tool two).

6.A pilot study was done on 16 nursing students to test the clarity, feasibility & applicability of the tools and the necessary modifications were done accordingly (the pilot study students not excluded from the sample).

7.The data were collected during the first semester of the academic year 2021-2022 over a period of three months starting from starting from October 2021 to January 2022.

8.Initially, nursing students' personal and academic characteristics were taken and recorded by the researchers for both groups through a self-administered questionnaire sheet that was distributed among students at the beginning of the academic semester.1

9.The study carried out according to the following: The students were allocated randomly as: study group: it comprised of 80 nurse students; who listen to Alfa music during the lectures of the whole scientific thinking course for about 60 minutes (the time of the original lecture). Control group: it comprised of 80 students who received the traditional lecture without listening to any music.

10. The study carried out according to the following three phases:

**Assessment (Preparation) phase,** during this phase, the researcher prepared **themselves**, **content**, **environment**, and **students**. Before starting data collection, the **researchers** prepared themselves through reading the available, updated references about Alfa music and its effect on the brain waves, **Content preparation,** through reviewing Intended Learning Outcomes (ILOs), preparing different Alfa music composite with low, moderate and high pitch. **Environment,** assuring that there were enough chairs and quiet place, and preparing lab top computer with modifiable sound system. **Students:** explaining the aim of the study and dividing them into two equal groups.

**Implementation Phase**, during this phase the researcher performed pretest for both groups using the two tools to assess students' brain hemispheres dominance and learning styles. For the study group: The application of background Alfa music took about 15 lecture in 15 weeks (the time of the first semester), 1 lecture / week; each lecture lasted for about 60 minutes (the time of the original lecture). The researchers turn on the music from the beginning of the lecture and start the lecture content explanation with music in the background and the music end with the end of the lecture. The level of Alfa music intense was gradually increased as it started with mild Alfa tone in the first five sessions then moderate Alfa tone in the second five sessions and finally high Alfa tone in the last five sessions. While for the control group, Traditional lecture strategy was applied without any background music for the whole course.

**The Evaluation phase**: In this phase the researchers assessed the students in both groups using the two tools to evaluate their brain hemispheres dominance and learning styles at the end of the semester.

## Ethical considerations

Before, applying the interventions and collecting the data, the researchers explained to them the detailed description of the nature of strategies and research purpose. They kept the subject's privacy. They also emphasized their right of self-determination and their rights above all other interests. The researchers also ascertained the participants' free decision to voluntarily participate in the study, right to refuse to participate or withdraw from the study at any time without any change of the quality of the received care. Confidentiality of the obtained data, students' anonymity and privacy was assured and maintained during the implementation of the study. After participants' agreement, they signed a written informed consent that included all those details.

### Statistical analysis of the data

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0*.* **(**Armonk, NY: IBM Corp**)** Qualitative data were described using number and percent. The **Kolmogorov-Smirnov** test was used to verify the normality of distribution Quantitative data was described using mean, and standard deviation. Significance of the obtained results was judged at the 5% level.

**The used tests were**

**1 - Chi-square test:** For categorical variables, to compare between different groups

**2 - Monte Carlo correction:** Correction for chi-square when more than 20% of the cells have expected count less than 5

**3-McNemar and Marginal Homogeneity Test:** Used to analyze the significance between the different stages

**4 - Mann Whitney test:** For abnormally distributed quantitative variables, to compare between two studied groups

**5 –Wilcoxon signed ranks test:** For abnormally distributed quantitative variables, to compare between two periods

**6 - Spearman coefficient:** To correlate between two distributed abnormally quantitative variables

## Results

Table (1) indicates absence of any statistically significant differences between the study and control groups in relation to their age, sex, last GPA, English and computer skills. Specifically, more than half of the study and control group were female and had 21 years old (52.5, 52.5%, 58.8%, 58.8%) respectively. Also, all both groups were at their fifth academic semester (100%). Moreover, about one third of the study group had B grade and less than one third of the control group had B grade (36.3 & 28.8 %) respectively. Regarding computer skills, approximately half of both groups had very good skills (50.0 & 52.5%) respectively, while near half of both groups had very good English level (38.8 & 45.0 %) respectively.

Table (2) shows comparison between the study and control groups according to Alert scale of cognitive style and VARK learning style before and after the intervention. Regarding cognitive style, it was found that; about three quarters of the study and control group had left hemisphere orientation before the intervention (76.3% , 76.3%) respectively. While after the intervention, about

more than three quarters of the study group had bilateral brain dominance compared to three quarters of the control group had left brain dominance (81.3%,76.3%) respectively. In the light on VARK learning style, it was found that; more than two third of the study group and more than three quarters of the control group had bimodal learning style before the intervention (68.8%,78.8%) respectively. While, after the intervention more than two third of the study group had trimodal learning style, one third had multimodal learning style and more than three quarters of the control group had bimodal learning style (66.3%,30%,80%) respectively. Finally, there were statistically significant difference between the study and control group in the favor of study group after the intervention regarding alert scale of the cognitive style and VARK learning style.

Table (3) shows comparison within the two studied groups according to Cognitive Alert Scale and VARK Learning Styles before and after the intervention. It was observed that; regarding study group, it was found that; about three quarters of the students had left brain dominance before the intervention compared to more than three quarters of them had bilateral brain dominance (76.3%,81.3%) respectively. Also more than two third of them had bimodal learning style before the intervention compared to more than two third of them had trimodal learning style and one third had multimodal learning style after the intervention (68.8%, 66.3%, 30%). Finally there was statistically significant difference between study group before and after the intervention in the favor of study after.

Regarding control group, it was found that; more than three quarters of them had left brain dominance before and after the intervention (76.3%, 76.3 %,) respectively. Also more than three quarters of them had had bimodal learning style before and after the intervention (78.8%,80%) respectively. Finally, there was no statistically significant difference between control group before and after the intervention

Table (4) state the correlation between Cognitive Alert Scale and VARK learning style, it was noted that there was a statistical significant difference and correlation between the brain dominance and VARK regarding study group after (p=0.001).

**Table (1): Comparison between the studied groups according to personal and academic data**

| | Study (n =80) No. | % | Control (n =80) No. | % | $\chi^2$ | p |
|---|---|---|---|---|---|---|
| **Sex** | | | | | | |
| Male | 38 | 47.5 | 38 | 47.5 | $\chi^2=$ | |
| Female | 42 | 52.5 | 42 | 52.5 | 0.000 | 1.000 |
| **Age (years)** | | | | | | |
| 20 | 33 | 41.3 | 33 | 41.3 | $\chi^2=$ | |
| 21 | 47 | 58.8 | 47 | 58.8 | 0.000 | 1.000 |
| **Semester (FIFTH)** | 80 | 100.0 | 80 | 100.0 | – | – |
| **GPA** | | | | | | |
| A | 10 | 12.5 | 8 | 10.0 | | |
| B+ | 0 | 0.0 | 1 | 1.3 | | |
| B | 29 | 36.3 | 23 | 28.8 | $\chi^2=$ | |
| B– | 19 | 23.8 | 21 | 26.3 | 4.287 | 0.509 |
| C+ | 19 | 23.8 | 19 | 23.8 | | |
| C | 3 | 3.8 | 8 | 10.0 | | |
| **Computer skills** | | | | | | |
| Good | 37 | 46.3 | 35 | 43.8 | | |
| Very good | 40 | 50.0 | 42 | 52.5 | $\chi^2=$ | 0.961 |
| Excellent | 3 | 3.8 | 3 | 3.8 | 0.196 | |
| **English** | | | | | | |
| Good | 29 | 36.3 | 31 | 38.8 | | |
| Very good | 31 | 38.8 | 36 | 45.0 | $\chi^2=$ | 0.382 |
| Excellent | 20 | 25.0 | 13 | 16.3 | 1.925 | |

$\chi^2$: **Chi square test**  p: p value for comparing between the studied groups  *: Statistically significant at $p \le 0.05$

**Table (2): Comparison between the studied groups before and after intervention according to Alert scale of cognitive style and VARK learning style before and after the intervention**

| | Before Study (n =80) No. | % | Control (n =80) No. | % | After Study (n =80) No. | % | Control (n =80) No. | % |
|---|---|---|---|---|---|---|---|---|
| **Cognitive** | | | | | | | | |
| - Left hemisphere orientation | 61 | 76.3 | 61 | 76.3 | 6 | 7.5 | 61 | 76.3 |
| - Bilateral hemisphere orientation | 3 | 3.8 | 4 | 5.0 | 65 | 81.3 | 4 | 5.0 |
| - Right hemisphere orientation | 16 | 20.0 | 15 | 18.8 | 9 | 11.3 | 15 | 18.8 |
| $\chi^2$(p) | | ($^{MC}$p =1.000) | | | | (<0.001*) | | |
| Mean ± SD. | 7.85 ± 3.25 | | 7.76 ± 3.22 | | 10.39 ± 2.19 | | 7.89 ± 3.20 | |
| U (p) | | (0.825) | | | | (<0.001*) | | |
| **VARK** | | | | | | | | |
| One modal learning style | 25 | 31.3 | 17 | 21.3 | 0 | 0.0 | 16 | 20.0 |
| Bimodal learning styles | 55 | 68.8 | 63 | 78.8 | 3 | 3.8 | 64 | 80.0 |
| Trimodal learning styles | 0 | 0.0 | 0 | 0.0 | 53 | 66.3 | 0 | 0.0 |
| Multimodal learning styles | 0 | 0.0 | 0 | 0.0 | 24 | 30.0 | 0 | 0.0 |
| $\chi^2$(p) | | (0.151) | | | | (<0.001*) | | |
| Mean ± SD. | 19.05 ± 3.59 | | 19.31 ± 3.38 | | 44.54 ± 9.14 | | 19.27 ± 3.28 | |
| U (p) | | (0.350) | | | | (<0.001*) | | |

SD:  **Standard deviation**          **Mann Whitney test**  $\chi^2$: **Chi square test**   MC: **Monte Carlo**
$p_1$: p value for comparing between the studied groups **before** intervention
$p_2$: p value for comparing between the studied groups **after** intervention *: Statistically significant at $p \le 0.05$

**Table (3): Comparison between the two studied groups according to Cognitive Alert Scale and VARK Learning Styles**

| | Study (n =80) | | | | Control (n =80) | | | |
|---|---|---|---|---|---|---|---|---|
| | Before | | After | | Before | | After | |
| | No. | % | No. | % | No. | % | No. | % |
| **Cognitive** | | | | | | | | |
| - Left hemisphere orientation | 61 | 76.3 | 6 | 7.5 | 61 | 76.3 | 61 | 76.3 |
| - Bilateral hemisphere orientation | 3 | 3.8 | 65 | 81.3 | 4 | 5.0 | 4 | 5.0 |
| - Right hemisphere orientation | 16 | 20.0 | 9 | 11.3 | 15 | 18.8 | 15 | 18.8 |
| **MH (p)** | $57.000^*(<0.001^*)$ | | | | 0.000 (1.000) | | | |
| Mean ± SD. | 7.85 ± 3.25 | | 10.39 ± 2.19 | | 7.76 ± 3.22 | | 7.89 ± 3.20 | |
| **Z (p)** | $4.442^*(<0.001^*)$ | | | | 1.781 (0.075) | | | |
| **VARK** | | | | | | | | |
| - One modal learning style | 25 | 31.3 | 0 | 0.0 | 17 | 21.3 | 16 | 20.0 |
| - Bimodal learning styles | 55 | 68.8 | 3 | 3.8 | 63 | 78.8 | 64 | 80.0 |
| - Trimodal learning styles | 0 | 0.0 | 53 | 66.3 | 0 | 0.0 | 0 | 0.0 |
| - Multimodal learning styles | 0 | 0.0 | 24 | 30.0 | 0 | 0.0 | 0 | 0.0 |
| **Test of Sig (p)** | $MH=194.0^* (<0.001^*)$ | | | | $^{McN}p=1.000$ | | | |
| - Mean ± SD. | 19.05 ± 3.59 | | 44.54 ± 9.14 | | 19.31 ± 3.38 | | 19.27 ± 3.28 | |
| **Z (p)** | $7.772^*(<0.001^*)$ | | | | 0.425 (0.671) | | | |

**SD:** Standard deviation          **Z:** Wilcoxon signed ranks test **McN:** McNemar test          **MH:** Marginal Homogeneity Test  *: Statistically significant at $p \leq 0.05$

**Table (4): Correlation between Cognitive and VARK**

| VARK | Cognitive | | | |
|---|---|---|---|---|
| | Study (n =80) | | Control(n =80) | |
| | $r_s$ | p | $r_s$ | P |
| Before | 0.111 | 0.326 | 0.041 | 0.719 |
| After | $-0.302^*$ | $0.007^*$ | 0.008 | 0.944 |

$r_s$: Spearman coefficient
*: Statistically significant at $p \leq 0.05$

## Discussion

There are many educational tools could be used to make classroom climate fun and friendly and music may be one of them. Moreover, brain's alpha waves can help learners enter a flow state, which allows them to do deep work with less effort. Alpha waves induce feelings of calm, increase creativity, and enhance the ability to absorb and process new information. In the current study, the researchers aimed to examine the effect of Alfa brain music waves on nursing students' cognition and learning style. It was found that about three quarters of study group had left hemisphere orientation which improved to be more than three quarters of them had bilateral hemisphere orientation after the intervention with a highly statistically significant difference between the study and control group in the favor of study group after. This finding may be related to that; during long study sessions, music can aid endurance. In addition to that music can help students with memorization, likely by creating a positive mood, which indirectly boosts memory formation and brain processing of information.

This result in line with **Shilawani (2010)** asserted that Alpha band indicates the listener's relaxed mood, thus promoting calmness. This state aids the process of capturing information, thereby enhancing learning. Also, a relaxed mood suggests a lower level of anxiety. Also, **Hassan et al (2012)** found that; while listening to a live performance of violin music, the

subject's brain induced both left and right brainwaves (theta, alpha and beta brainwaves) to be balanced. The study points to a possible relationship between frequency and power emitted by live music in affecting human brainwaves.

Furthermore, **Gizii and Albi (2017)** who examined by using neuroimaging studies the location and extent of various brain areas activation when using Alfa music. Who found that; many areas in both hemispheres became wider, stronger, more pigmented, and concentric with an increase in the dimensions of corpus coliseum. These changes improved the connection between the two hemispheres and promoted the growth of the inter-module connections which were responsible for the cognitive development in students' brain.

Moreover, **Chambers and de Boer (2018)** stated that music interventions that make teachers aware of the expectations and behaviors of the students can raise both teacher expectations and student achievement. As educators, beliefs and expiations need to be aligned with the fact that all students need to use all of their brains in classrooms. While, **Khotimah and Phys (2019)** showed through the brain neuroimaging studies a significant activation in the two hemispheres as it were lighted up to determine how the brain is involved in most cognitive tasks after using Alfa music.

Spotting the light on students' VARK learning style, it was found that more two third of the study group had bimodal learning styles , increased to be trimodal and one third was multimodal learning styles after performing the intervention with a highly statistically significant difference between the study and control groups in the favor of study group after. The previous results came in agreement with **Friedel and Rudd (2007)** who stated that, after using Alfa music for at least one lecture/ week for 3 weeks, learners developed more than one learning style and possessed more flexible views and acceptance of their learning environment. Moreover, **Slack and Norwich (2007)** revealed that after the utilization of Alfa music in the classroom; students used multiple

styles and tended to be more cognitively affected by the instruction. Also the students' learning styles were improved to trimodal and multimodal and retained academic content for longer time and performed better on assessments.

Furthermore, **Allcock and Hulme (2010)** asserted that integration of Alfa music with VARK learning preferences made it easy to know how the brain works most efficiently to process, comprehend and learn new information. Also **Can and Guven (2020)** who examined the effects of doing learning activities in English lessons with background Alfa music on class-related enjoyment, boredom and anger of students with different learning styles. Who observed that; doing learning activities with background Alfa music create positive emotions in students ,has a positive motivation  and their learning style were improved .

From the researcher's point of view this result may be due to the following, it is well known that each one's learning style is unique. Listening to music can teach more effectively with a basic understanding of VARK learning preferences and teaching strategies. Moreover, once a student's primary learning style can be identified as visual, aural, read/write, kinesthetic or multi-modal. By choosing repertoire that engages a student's learning preferences and by employing teaching strategies that complement those preferences, music can capitalize on students' strengths and build upon their weakness. Also it makes the learning easier and more enjoyable.

Finally, there were it was noted that there was a statistical significant difference and correlation between the brain dominance and VARK regarding study group after (p=0.001). This  result may be due to the physiological centers of both hemispheres which linked with physiological function of VARK style in the brain. This come in congruence with the result of **Michael (2009)** who found that after applying Alfa music  students with left hemisphere dominance who was dominant in language reading and writing and students with right hemisphere dominance who were in charge of visual abilities, exhibited the

characteristics of both brain hemispheres. Also **Vitale (2010)** determined that; when the Alfa music was applied, dominant functions either right or left could be grouped under four categories or styles as VARK learning style to be bilateral dominant multimodal preference

Also, **AlKhasawneh (2013)** found a strong relation between the right, left side of the brain and the VARK style after the application of Alfa music, as the majority of the bilateral brain students became multimodal persons. Who became visual learners who could see a three dimensional image in their minds, imaginative, know exactly what they meant and liked to be concrete, to see, feel or touch the real object which are right side characteristics. Also became good at the language process and had the ability to write and read in perfect faster manners which were left side characteristics. In the same line, **Posner, Michael and Mary (2014)** found that; after mixing Alfa music with traditional teaching methods as colors, hyperlinks, animation, videos and role play (based on right brain, visual and kinesthetic learning styles) with lectures, discussion, talk and demonstration (based on the left brain, aural, reading and writing learning style) the students became multimodal bilaterally dominant with various degrees.

**Conclusion**

Alfa brain music had positive impact on students' learning, improve the usage of both brain hemisphere and engaging students with different learning styles.

**Recommendations**

It can be recommended that teacher should use Alfa music during lectures and sections with different specialties and try to use other types of music with its specified purpose.

**References**

**AlKhasawneh, E.(2013).** Using VARK To Assess Changes In Learning Preferences Of Nursing Students At A Public University In Jordan: Implications For Teaching Through

Brain Based Learning Teaching .Nursing education today, 12 (8);1501-5.

**Allcock, S., Hulme, J. 2010;**Learning styles in the classroom: educational benefit or planning exercise? Psychology Teaching Journal . 16(2): 67-79.

**Bradley, N. (2014).** Left Brain vs Right Brain. Mental Health Journal,36(6);220-41.

**Byrne ,B.(2014).** Neuroscience and Learning: Implications for Teaching Practice. Journal of Experimental Science, 5(2); 34-45.

**Caine, G. (2018)** The Key to Powerful Learning*:* the 12 brain/mind learning principles in Action. 4th ed. London; Corwin Press.

**Can, Y., Güven, M. (2020).** The Effects of Music on Achievement Emotions and Self-Efficacy Beliefs of Students Who Have Different Learning Styles. Science, Education, Art and Technology Journal ,4(2); 95-113.

**Chambers, N., Kashefpakdel, E., Rehill, J., Percy, C. (2018).** Drawing The Future ;Education And Employers. 2nd ed. Wilson Pub ;London, UK,.

**Crane ,L.(1989).** Alert scale of cognitive style questionnaire. Michigan University.. Available at: http//:cte.dce.Michigen. edu/.../ Hemisphere Preference Interaction.

**Fleming, N.(2010).** VARK questionnaire version 7.8.Corneal learning initiative for medical and bioengineering science. Corneal university. 2010. Available at: ttp://climb.bme.cornell.edu/documents/vark _quiz.pdf.

**Frank, H. Human Anatomy. (2015).** 8th ed. Philadelphia; Lippincott Williams & Wilkins.

**Friedel, N., Rudd ,H.(2007).** Brain Based Learning Myth Versus Reality Testing Of Learning Styles. Science Based Medicine Journal,5(2);14:23.

**Gizzi ,G.,Albi,A.(2017)** .The music in the brain hemispheres.The EuroBiotech

Journal;                    1(4):259-
263.DOI:10.24190/ISSN2564-
615X/2017/04.01

**Hussain ,I. (2017).**Pedagogical Implications of
    VARK Model of Learning. Journal of
    Literature, Languages and Linguistics; 38;
    ISSN 2422-8435 .

**Jensen, E. (2016).** Teaching with the Brain in
    Mind.3rd ed. USA; Eric Jensen Institute pub.
    Philadelphia, USA.

**John, D., Rodney, L. (2015).** How Brains
    Learn .Washington; National Academy
    Press.

**Khotimah,S., Phys,J. (2019)** . Characterization
    of the changes in electroencephalogram
    power spectra due to sound stimulation.
    Journal of Physics: Conference Series.
    doi:10.1088/1742-6596/1248/1/012022

**Kučikienė, D., Praninskienė, R. (2018).** The
    Impact of Music on the Bioelectrical
    Oscillations of The Brain. Acta Med Litu,
    25(2); Doi: 10. 6001/ actame dica .v25i
    2.3763

**Levitin, D. (2015).** THIS is Your Brain on the
    Science of a Human Obsession. Dutton Pub,
    Penguin Group; USA.

**Lo, Y., Deng, Y. (2020).** A Study on
    Characterization of Alpha Wave Music.
    International Journal of Advanced
    Information Technologies ,12(2).

**Lorimer, A. (2020).** The Cerebrum, its
    hemispheres and structures. Research Report.
    Griffith University. Research Gate
    DOI:10.13140/RG.2.2.11676.72321

**Michael ,W. (2009).**Brain-Based Teaching
    Strategies Application For Increasing
    Learning Abilities. Published doctorate
    dissertation. North Carolina University.
    Available at:http://Eulc. edu. eg. search.
    Proquest. com / pqdtgl / fulltextPDF/.

**Posner, K., Michael ,H ., Rothbart, K.(2014).**
    Educating the human brain. Washington;
    American Psychological Association.

**Rahman, J., Geadeon, A., et al. (2020).**Brain
    Melody Informatics: Analyzing Effects of
    Music on Brainwave Patterns. International
    Joint Conference on Neural Networks
    (IJCNN),          DOI:10.1109/IJCNN48605.
    2020.920 7392.

**Shilawani, N., Ghazali,M., et al. (2010).** The
    Preliminary Study On The Effect of  Music
    on Brainwave Signal Using EEG. 2nd
    International Congress on Engineering
    Education, Kuala Lumpur, Malaysia.

**Slack, A., Norwich ,R. (2007).** The Learning
    Styles and The Preferred Teaching Learning
    Strategies of Medical First Year Students.
    Journal of Clinical and Diagnostic
    Research,1(2);90-6.

**Standring, S.(2020).**Gray's Anatomy; The
    Anatomical Basis of Clinical Practice.42nd
    Ed. Elsevier, USA.

**Vitale, B.(2010).** A Right Left-Brained
    Approach To Learning. Journal of
    Instructional Psychology,8(4);51-63.